# Immunization Update

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Kansas Immunization Conference
September 8, 2011

This information is valid as of August 30, 2011

## Disclosures

- William Atkinson is a federal government employee with no financial interest or conflict with the manufacturer of any product named in this presentation
- The speaker will discuss the off-label use of meningococcal conjugate and Tdap vaccines
- The speaker will not discuss a vaccine not currently licensed by the FDA

## Disclosures

- The recommendations to be discussed are primarily those of the Advisory Committee on Immunization Practices (ACIP)
  - composed of 15 experts in clinical medicine and public health who are not government employees
  - provides guidance on the use of vaccines and other biologic products to the Department of Health and Human Resources, CDC, and the U.S. Public Health Service

www.cdc.gov/vaccines/recs/acip/

## What's New in Immunization

- New influenza vaccine and recommendations
- Expansion of meningococcal conjugate vaccine recommendations
- Tdap vaccine for pregnant women, children 7-9 years and persons 65 years and older
- PCV13
- Zoster vaccine for persons 50-59 years of age

## Influenza Vaccination Recommendation

- **Annual influenza vaccination is recommended for every person in the United States 6 months of age and older**

*MMWR* 2010;59(RR-8)

## Rationale: Recommendation to Vaccinate All Persons 6 Months of Age or Older

- Morbidity and mortality occurs in all age groups, including among adults 19-49 years of age
- Some persons who have influenza complications
  - have no previously identified risk factors
  - have risk factors but are unaware that they should be vaccinated, or
  - might be at risk due to newly identified risk factors (e.g., morbid obesity)
- Simplicity

*MMWR* 2010;59(RR-8)

## Timing of Influenza Vaccination

- Immunization providers should begin offering vaccine as soon as it becomes available in the office
- Providers should offer vaccine during routine healthcare visits or during hospitalizations whenever vaccine is available
- Continue to vaccinate throughout influenza season (December through March) especially to healthcare personnel and those at high risk of complications

*MMWR* 2010;59(RR-8)

## Influenza Vaccine Components 2011-2012

- Same 3 influenza strains as the 2010-2011 seasonal vaccine
  - A/California/7/2009 (H1N1)-like
  - A/Perth/16/2009 (H3N2)-like
  - B/Brisbane/60/2008-like
- A dose of 2011-2012 vaccine is recommended regardless of whether the person received 2010-2011 vaccine
- Both inactivated and live attenuated vaccines will be available

*MMWR* 2011;60(33):1128-32

## Influenza Vaccine Presentations 2011-2012

| Vaccine | Doseform | Age |
|---|---|---|
| Fluzone TIV (sanofi pasteur) | SDS, SDV, MDV | 6 months and older |
| Fluarix TIV<br>FluLaval TIV (GSK) | SDS<br>MDV | 3 years and older<br>18 years and older |
| Fluvirin TIV (Novartis) | SDS, MDV | 4 years and older |
| Afluria TIV (CSL) | SDS | 9 years and older |
| Flumist LAIV (MedImmune) | Nasal spray | 2-49 years (healthy, nonpregnant) |

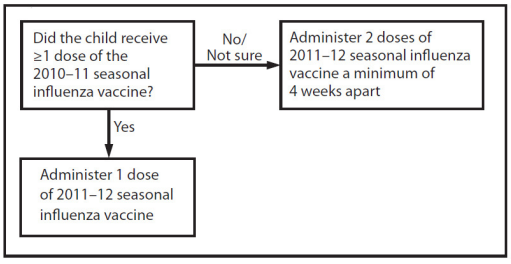
SDS=single dose syringe; SDV=single dose vial; MDV=multidose vial

## Influenza Vaccination of Children 6 Months Through 8 Years of Age

- Recommendations for the number of doses of influenza vaccine for children 6 months through 8 years of age are different than in previous years
- The only factor to consider is whether or not the child received influenza vaccine during the 2010-2011 season
  - no 2010-2011 vaccine ➡ 2 doses
  - 1 or more doses during the 2010-2011 season ➡ 1 dose this year

*MMWR* 2011;60(33):1128-32

Influenza vaccine dosing algorithm for children aged 6 months through 8 years — Advisory Committee on Immunization Practices (ACIP), 2011–12 influenza season




*MMWR* 2011;60(33):1128-32

## Fluzone TIV Formulations

| Formulation (age) | HA per dose |
|---|---|
| • Adult (≥36 mos) | 45 mcg/0.5 mL |
| • Pediatric (6-35 mos) | 22.5 mcg/0.25 mL |
| • High dose (≥65 yrs) | 180 mcg/0.5 mL |
| • Intradermal (18-64 yrs) | 27 mcg/0.1 mL |

*MMWR* 2011;60(33):1128-32

## Fluzone High-Dose

- Contains 4 X amount of influenza antigen than regular Fluzone
- Approved only for persons 65 years and older
- Produced higher antibody levels; slightly higher local reactions
- Studies underway to assess clinical effectiveness
- No preference stated by ACIP for HD or regular influenza vaccination

*MMWR* 2011;60(33):1128-32

## Fluzone Intradermal

- Licensed by FDA in May 2011
- Approved only for persons 18 through 64 years of age
- Dose is 0.1 mL administered by a specially designed microneedle injector system in the deltoid (not the forearm)
- Formulated to contain more HA (27 mcg) than a 0.1 mL dose of regular Fluzone formulation (9 mcg)

*MMWR* 2011;60(33):1128-32

## Influenza Vaccination of Persons with Egg Allergy

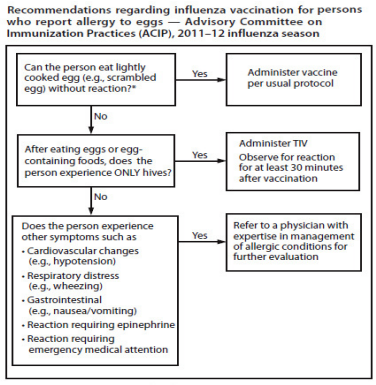
- All types and formulations of influenza vaccine contain residual egg protein (ovalbumin)
- The amount of ovalbumin per dose varies by manufacturer, vaccine type, and lot
- Many persons with "egg allergy" can tolerate receipt of TIV without serious reaction

*MMWR* 2011;60(33):1128-32

## Influenza Vaccination of Persons with Egg Allergy

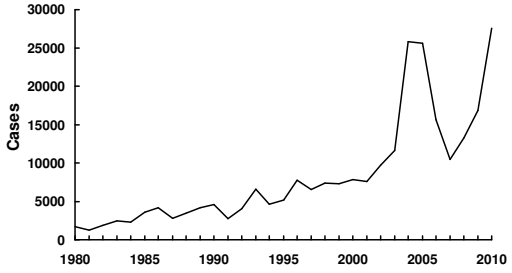
- If the person can eat cooked eggs without a reaction ➡ vaccinate (TIV) without special precautions
- If after eating egg or egg-containing food the person has hives only ➡ vaccinate (TIV) and observe for at least 30 minutes
- If the person has hives and other symptoms (e.g. wheezing, nausea) then refer the person to a physician with expertise in management of allergy
- LAIV should not be administered to persons with egg allergy

*MMWR* 2011;60(33):1128-32

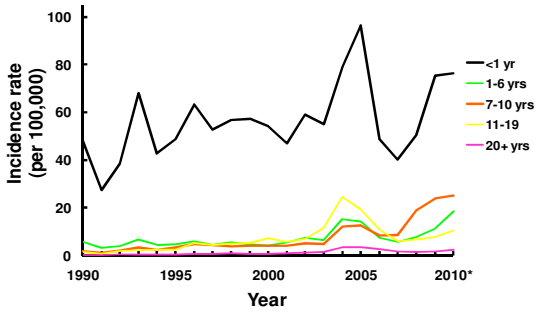



*MMWR* 2011;60(33):1128-32

## Pertussis - United States, 1980-2010



## Reported Pertussis Incidence by Age Group - 1990-2010*




SOURCE: CDC, National Notifiable Diseases Surveillance System and Supplemental Pertussis Surveillance System. *2010 data are provisional

## Reported Pertussis-related Deaths by Age Groups, U.S., 1980-2010*

| Age-Group | 1980-1989[1] | 1990-1999[1] | 2000-2010[2] |
|---|---|---|---|
| 0-1 month | 38 | 68 | 170 |
| 2-3 month | 11 | 16 | 28 |
| 4-5 month | 5 | 5 | 2 |
| 6-11 month | 7 | 4 | 1 |
| 1-4 years | 13 | 2 | 3 |
| 5-10 years | 1 | 6 | 3 |
| 11-18 years | 0 | 0 | 3 |
| >18 years | 1 | 2 | 11 |
| Total | 77± | 103 | 221 |

± Includes one case with unknown age

[1] Vitek CR et al. Pediatr Infect Dis J 2003; 22(7):628-34.

[2] National Notifiable Diseases Surveillance System, CDC, *Provisional 2010 data

## Tdap

- Tdap reduces the risk of pertussis by 60% - 80%
- Both Tdap products currently approved for one lifetime dose
- Tdap approved ages
  - 10 years and older for Boostrix
  - 11 through 64 years for Adacel
- Neither brand of Tdap is approved by the FDA for children 7 years through 9 years and Adacel is not approved for adults 65 years or older

Wei SC et al. *Clin Infect Dis* 2010;51:315-21

## Tdap Recommendations for Adolescents and Adults

- All adolescents should preferably receive Tdap at the 11 to 12 year-old preventive healthcare visit
- Persons 11 through 18 years of age who have not received Tdap should receive a dose
- All adults, especially healthcare personnel and those with close contact with infants, should receive Tdap if they have not previously received a dose

*MMWR* 2011; 60 (No. 1):13-5

## New Tdap Recommendations for Adolescents

- Persons 7 through 10 years of age who are not fully immunized against pertussis (including those never vaccinated or with unknown pertussis vaccination status) should receive a single dose of either brand of Tdap*
- "Not fully immunized"
  - fewer than 4 doses of DTaP
  - 4 doses of DTaP and last dose was prior to age 4 years

*off-label recommendation. *MMWR* 2011; 60 (No. 1):13-5

## New Tdap Recommendations for Adults*

- Adults 65 years of age and older who have or who anticipate having close contact with an infant younger than 12 months of age and who have not previously received Tdap should receive a single dose of either brand of Tdap
- Other adults 65 years of age and older may receive a dose of either brand of Tdap

*off-label recommendation. *MMWR* 2011; 60 (No. 1):13-5

## Tdap and Pregnancy

- Infants are most likely to be hospitalized or die from pertussis
- If a woman receives Tdap before or during pregnancy, her passive immunity might help protect the newborn from pertussis
- There are few safety data for pregnant women given Tdap
- There are concerns by some experts that the passive pertussis antibody could interfere with the infant's response to DTaP

## Tdap Recommendations for Pregnant Women*

- Any woman who might become pregnant is encouraged to receive a single dose of Tdap
- Tdap is preferred over Td during pregnancy if no prior Tdap dose
- Vaccinate during third trimester or late in second trimester (after 20 weeks gestation)
- Alternatively, administer Tdap immediately postpartum

*Recommendations approved by ACIP in June 2011; not yet published

## Td-Tdap Interval Recommendation*

- Tdap can be administered regardless of the interval since the last tetanus and diphtheria containing vaccine
- ACIP concluded that while longer intervals between Td and Tdap vaccination could decrease the occurrence of local reactions, the benefits of protection against pertussis outweigh the potential risk for adverse events

*off-label recommendation. *MMWR* 2011; 60 (No. 1):13-5

## Meningococcal Vaccines

- Meningococcal polysaccharide vaccine
  - first licensed in 1974
  - limited indications
- Meningococcal conjugate vaccines
  - First licensed in 2005
  - only vaccine recommended for routine use among civilians

## Menactra MCV4 Vaccine

- Quadrivalent polysaccharide vaccine (A, C, Y, W-135) conjugated to diphtheria toxoid
- Approved for a single dose among persons 9 months* through 55 years of age
- FDA approval based on serologic non-inferiority compared to meningococcal polysaccharide vaccine

*as of April 22, 2011

## Menveo MCV4 Vaccine

- Approved by FDA in February 2010 for a single dose among persons 2 through 55 years of age
- Lyophilized serogroup A vaccine reconstituted with liquid containing serogroups C, Y, and W135
- FDA approval based upon serologic non-inferiority to Menactra

*MMWR* 2010;59(No. 9):273

## Meningococcal Conjugate Vaccine (MCV4) Issues

| Issue | Solution |
|---|---|
| • Inadequate response to a single dose of MCV4 | • Routine 2-dose primary series |
| • Waning immunity following 1 dose of MCV4 | • Revaccination of some MCV4 recipients |
| • Routine vaccination of infants | • Vaccination of high-risk; routine vaccination being considered |

## Persons at Highest Risk of Meningococcal Disease or Suboptimal Vaccine Response

- Complement deficiency
  - very high antibody titer required to compensate for complement deficiency
- Asplenia
  - evidence of suboptimal response
- Single dose primary series may not be sufficient to confer protection for persons with these high-risk conditions

## New MCV4 Recommendations

- Administer 2 doses* of MCV4 at least 8 weeks apart to persons with persistent complement component deficiency and anatomic or functional asplenia, and 1 dose every 5 years* thereafter

* off-label recommendations. *MMWR* 2011;60(No. 3):72-6.

## MCV4 Recommendations and HIV

- HIV infection alone is not an indication for MCV4 vaccination
- Persons with HIV infection show evidence of suboptimal response to vaccination
- Some persons with HIV infection should receive MCV4 (adolescents, some international travelers, microbiologists, etc)
- Persons with HIV infection who are vaccinated with MCV4 should receive 2 doses at least 8 weeks apart*

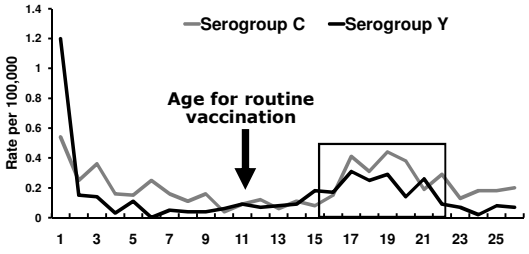
*off-label recommendation. *MMWR* 2011;60(No. 3):72-6.

## New MCV4 Recommendations

- Persons with complement component deficiency, asplenia who previously received 1 dose should receive a second dose* at the earliest opportunity
- Persons with HIV who previously received 1 dose *and for whom vaccination is still indicated* should be given a second dose*

*off-label recommendations. *MMWR* 2011;60(No. 3):72-6.

## Rates of Meningococcal Disease (C and Y) by Age, 1999-2008



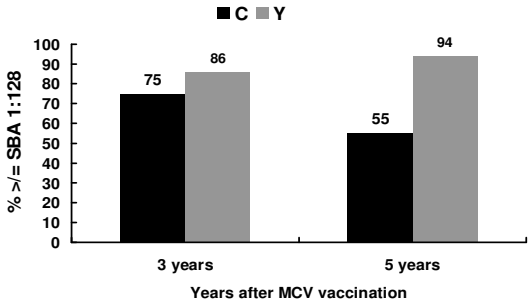

Active Bacterial Core surveillance (ABCs), 1998-2008

## MCV4 Revaccination

- In its 2005 recommendations for MCV, ACIP made no recommendation about revaccination pending the availability of additional data
- Serologic data are now available that show significant decline in antibody 3-5 years after vaccination although few "breakthrough" cases have been reported

*MMWR* 2009;58(No. 37):1042-3

## Seroprotection Rates Following MCV Vaccination




*MMWR* 2009;58(No. 37):1042-3

## New MCV4 Recommendations*

- New recommendations
  - administer MCV4 at age 11 or 12 years with a booster dose at 16 years of age
  - administer 1 dose at age 13 through 15 years if not previously vaccinated
  - for persons vaccinated at age 13 through 15 years administer a 1-time booster dose is recommended, preferably at or after 16 through 18 years of age

*off-label recommendation. *MMWR* 2011;60(No. 2):72-6.

## New MCV4 Adolescent Vaccination Recommendations

- The minimum interval between doses is 8 weeks
- A booster dose is not recommended for healthy persons if the first dose is administered at 16-21 years of age
- A booster dose is not recommended for healthy persons persons 22 years or older even if the first dose is administered at 11-15 years of age
- The booster dose should always be MCV4 (not MPSV4)

## MCV Revaccination Recommendations*

- Other high-risk persons recommended for revaccination
  - microbiologists with prolonged exposure to *Neisseria meningitidis*
  - frequent travelers to or persons living in areas with high rates of meningococcal disease
- Revaccinate every 5 years as long as the person remains at increased risk
  - MCV for persons 2 through 55 years of age
  - MPSV for persons 56 years and older

*off-label recommendation. *MMWR* 2009;58(No. 37):1042-3

## Meningococcal Vaccination of Children 9-23 Months of Age*

- In April 2011 FDA approved Menactra for children as young as 9 months
- ACIP recommends Menactra for high-risk children 9 through 23 months of age
  - 2-dose series
  - 3-month interval between doses
  - administer at 9 and 12 months of age (minimum interval 2 months)

*Recommendation approved by ACIP in June 2011; not yet published

## Meningococcal Vaccination of Children 9-23 Months of Age*

- ACIP defines high-risk children age 9 through 23 months as:
  - those with persistent complement component deficiency
  - those in a community or institution where a meningococcal disease outbreak is occurring, or
  - those traveling to an area of the world where meningococcal disease is epidemic

*Recommendation approved by ACIP in June 2011; not yet published

## Meningococcal Vaccination of Children 9-23 Months of Age*

- High-risk children 9 through 23 months of age
  - children who need protection prior to international travel can receive the second dose as early as 2 months after the first dose
  - the minimum age for meningococcal vaccination of children with asplenia (including those with sickle cell disease) is 2 years

*Recommendation approved by ACIP in June 2011; not yet published

## Pneumococcal Conjugate Vaccine, 13-valent (PCV13)

- Contains the same serotypes of *S. pneumoniae* as PCV7 plus 6 additional serotypes (including 19A)
- Approved by FDA for use among children 6 weeks through 71 months of age
- Same 4-dose schedule as PCV7
- Series started the PCV7 should be completed with PCV13 if possible

*MMWR* 2010;59(No. 6):258-61

## ACIP Recommendations for PCV13 Supplemental Dose

- A single supplemental dose of PCV13 is recommended for children who have received a complete age-appropriate series of PCV7
  - all children 14 through 59 months of age
  - children 60 through 71 months of age with an underlying medical condition (including those who have already received a dose of PPSV)

*MMWR* 2010;59(No. 6):258-61

TABLE 2. Underlying medical conditions that are indications for pneumococcal vaccination among children, by risk group

| Risk group | Condition |
|---|---|
| Immunocompetent children | Chronic heart disease* |
| | Chronic lung disease† |
| | Diabetes mellitus |
| | Cerebrospinal fluid leaks |
| | Cochlear implant |
| Children with functional or anatomic asplenia | Sickle cell disease and other hemoglobinopathies<br>Congenital or acquired asplenia, or splenic dysfunction |
| Children with immunocompromising conditions | HIV infection |
| | Chronic renal failure and nephrotic syndrome |
| | Diseases associated with treatment with immunosuppressive drugs or radiation therapy, including malignant neoplasms, leukemias, lymphomas and Hodgkin disease; or solid organ transplantation |
| | Congenital immunodeficiency§ |

**Source:** Advisory Committee on Immunization Practices, 2010.
* Particularly cyanotic congenital heart disease and cardiac failure.
† Including asthma if treated with high-dose oral corticosteroid therapy.
§ Includes B- (humoral) or T-lymphocyte deficiency; complement deficiencies, particularly C1, C2, C3, and C4 deficiency; and phagocytic disorders (excluding chronic granulomatous disease).

*MMWR* 2010;59(No. 6):258-61

## ACIP Recommendations for PCV13 Supplemental Dose

- A single dose of PCV13 may be administered to children 6 through 18 *years* of age who are at increased risk for invasive pneumococcal disease*
  - functional or anatomic asplenia, including sickle cell disease
  - HIV infection and other immunocompromising conditions
  - cochlear implant
  - CSF leak

*off-label recommendation. *MMWR* 2010;59(No. RR-11):1-19

## Herpes Zoster Vaccine (Zostavax)

- Administered to persons who had chickenpox to reduce the risk of subsequent development of zoster and postherpetic neuralgia
- Contains live varicella vaccine virus in much larger amount (14x) than standard varicella vaccine (Varivax)
- Reduces the risk of zoster ~50% in persons 60 years and older
- Reduces the risk of zoster ~70% in persons 50-59 years

*NEJM* 2005;352(22):2271-84 and zoster package insert (2011)

## Zoster Vaccine

- On March 24, 2011 the Food and Drug Administration approved a label change for zoster vaccine to include persons 50 through 59 years of age
- ACIP declined to recommend vaccination of persons younger than 60 years because of inadequate supply and lower risk of zoster in this age group
- An ACIP recommendation is not necessary for clinicians to use a vaccine according to license

## ACIP Recommendations for Zoster Vaccine

- Adults 60 years and older should receive a single dose of zoster vaccine
- Need for booster dose or doses not known at this time
- A history of herpes zoster should not influence the decision to vaccinate

*MMWR* 2008;57(RR-5)

## Zoster Vaccine

- It is not necessary to inquire about chickenpox or test for varicella immunity before administering zoster vaccine
- Persons 60 years of age and older can be assumed to be immune* regardless of their recollection of chickenpox

*MMWR* 2008;57(RR-5)
*for the purpose of establishing eligibility for zoster vaccine

## Zoster and Pneumococcal Polysaccharide (PPSV) Vaccines

- Zoster package insert advises that zoster and PPSV should not be administered concurrently
- Based on a study that showed the titer against VZV was lower in persons who received zoster and PPSV at the same visit compared to persons who received these vaccines 4 weeks apart

## Zoster and PPSV Vaccines

- Study examined the incidence of zoster (per 1000 person-years) among persons in a large HMO 60 years and older who received zoster and PPSV vaccines on the same day or PPSV 30 to 365 days before zoster vaccine
  - –same day 4.55
  - –different visits 4.51

*Vaccine* 2011;29:3628-32

## Zoster and PPSV Vaccines

- CDC has not changed its recommendation for either vaccine
- Zoster and PPSV should be administered at the same visit if the person is eligible for both vaccines

## CDC Vaccines and Immunization
### Contact Information

- **Telephone** 800.CDC.INFO
  (for patients and parents)
- **Email** nipinfo@cdc.gov
  (for providers)
- **Website** www.cdc.gov/vaccines/
- **Vaccine Safety** www.cdc.gov/vaccinesafety/